

High Frequency Monitoring Reveals Aftershocks in Subcritical Crack Growth

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ABSTRACT

By combining direct imaging and acoustic emission measurements, the subcritical propagation of a crack in a heterogeneous material (sheets of paper) is analyzed. Both methods show that the fracture proceeds through a succession of discrete events. However, the macroscopic opening of the fracture captured by the images results from the accumulation of more-elementary events detected by the acoustics. When the acoustic energy is cumulated over large time scales corresponding to the image acquisition rate, a similar statistics is recovered. High frequency acoustic monitoring reveals aftershocks responsible for a timescale dependent exponent of the power law energy distributions. On the contrary, direct imaging, which is unable to resolve these aftershocks, delivers a misleading exponent value.

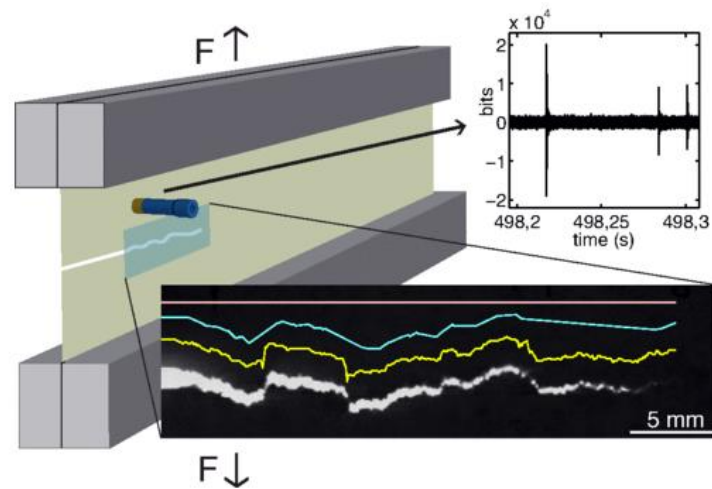


Fig. 1: Scheme of the experimental set-up

References

1. M. Stojanova, S. Santucci, L. Vanel, and O. Ramos, *Physical Review Letters* **112**, 115502 (2014).